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29 July 1963

UNITED STATES INTELLIGENCE BOARD
COMMITTEE ON DOCUMENTATION

Draft Contribution of CODIB to
USIB Report on U. S. Foreign
Intelligence Objectives

1. The attached draft has been prepared pursuant to USIB-M-376, item 10.b. (2) (b); Chairman, CODIB memo of 11 July; and CODIB-D-107.

2. Written contributions were received on schedule from State, DIA and CIA. An attempt has been made to incorporate as much as possible within the limits of 10 double spaced pages, and to be as responsive as possible to the terms of reference.

3. CODIB will meet on this draft at 10:00 Thursday, August 1, in Conference Room 2E62, CIA Headquarters. If you have any questions, please call me

JOHN K. VANCE
Acting Chairman

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29 July 1963

**PROGRAMS AND PLANS FOR ACTION TO ACCOMPLISH
UNITED STATES FOREIGN INTELLIGENCE OBJECTIVE NO. 3**

INFORMATION PROCESSING TECHNIQUES

I. OBJECTIVE NO. 3

That research be intensified to determine the usefulness of data processing techniques, including mechanized title or summary sentence permutation, to facilitate review and assessment of the great volume of material that must be dealt with in the Intelligence Community.

II. THE PROBLEM IN PERSPECTIVE

Restated, this objective raises the question: How are we assisting the intelligence analyst to effectively use the voluminous information which must be handled? A capsule answer is: in any way we can, including the use of machines.

The means employed are both considerable and varied. For the intelligence pursuit of this objective is one of the most demanding tasks of the Intelligence Community; the likelihood of its early attainment to our satisfaction most uncertain. Encompassed are problems of information extraction, retrieval and evaluation from ever larger amounts of data beyond unaided human processing capabilities. This is the area of non-numerical information processing, one not yet formalized in any recognizable mathematical or logical form, and hence not within foreseeable solution through machine use. Potentially promising, the art of automating the human intellect is so poorly developed that it is difficult even to evaluate claims. And hopes are often reported as accomplishments.

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As of today, only man possesses the intelligence and insight to ask questions, and to recognize a good solution when it turns up. Thus the most promising course is to get good men, organize them well, and give them as much machine assistance as the current state of the art permits, all the while encouraging further advances in the state of the art.

The techniques of information processing, whether manual, machine or in combination, are designed to act as filters, thus reducing in successive stages the volume of flow. The object is to provide each analyst a timely flow of all ^{he} ~~the~~ needs but only what he needs. The filters employed include: (1) selective collection and communication in response to stated requirements; (2) digest reporting through summary, abstraction or extraction, whether involving translation or not; (3) selective dissemination; and (4) selective storage for possible later retrieval in order to reduce the files of analysts to current needs. While these operations are today still largely manually performed, the man-machine combination is increasingly in evidence, as illustrated by the examples reported on below.

III. OPERATIONAL AND DEVELOPMENT PROGRAMS

Communication

The intelligence community's facilities for recording, transmitting, and delivering information from the collector in the field to the intelligence analyst are now experiencing the benefits of major technological advances. The new equipment coming into use is shortening to a matter of hours the delivery by secure electronic means of a much increased segment of field reporting that recently required days or weeks to approve by surface or airmail. This is significant to the analyst in promoting

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a better synchronized analysis of important events based on fuller reporting. It is significant to central information processing systems in making field reporting potentially available for the first time in machine language form for the eventual development of computer based indexing and dissemination systems.

Related developments in this field include the recent inauguration of the CRITIC system for prompt reporting of highest priority information from field to headquarters. Both CIA and DIA are implementing programs based initially on punched card systems for organizing and collating collection requirements and for follow-up evaluations of field performance. The Intelligence Community has immediate application for an improved secure system for electronic transmission of graphic materials over long distances and between information centers. A secure voice communication system between headquarters analysts and field collectors will promote a better focussing of reporting. Much research is underway in both of these areas elsewhere in the government and in private industry. Application of oncoming systems to intelligence merits priority attention.

Central Document Indexing and Storage

There have been two parallel and closely associated lines of development since World War II in the design and operation of the central information control systems of the Intelligence Community. The first of these has concerned the indexing of incoming intelligence information reports - about 275,000 items per year - according to a comprehensive subject classification scheme developed by the intelligence community. The index record for each document is stored on punched cards and the output to the intelligence analyst in response to a search query is a bibliography of document titles prepared by partially automated means.

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The information reports themselves are recorded on microfilm and mounted in aperture cards from which reproductions are readily obtained in response to requests. As a general proposition the physical storage and retrieval of documents using microfilm techniques has been brought to a high state of proficiency in the community. Sheer availability of the document to the analyst is no longer the critical problem that it was prior to 1955. The CIA WALNUT system - cf. below - now provides a further and proved step forward in automating microfilmed document storage and retrieval. Its applicability to other document library systems in the community in the relatively near future is highly promising. There are at present no critically urgent research problems in this area of support to analysts although concepts for electronic display of documents at the analysts' desk continue to receive attention. Central film-based document systems are also steadily contributing to the control of size and rate of growth of analysts' personal information files.

The second line of evolution in postwar central systems has consisted of the development of specialized libraries or "registers" for the management of biographic, industrial, and graphic data extracted from intelligence documents and from open literature. The retrieval service provided analysts consists of concrete information concerning individuals, manufacturing plants, equipment or photographs thereof. Punched card systems have provided the principal means to data to record, organize and list out the data for the analyst.

Representative Current Applications of Computers

Computer technology reached a sufficiently advanced state by about 1955 to

justify and stimulate investigation of its potential for replacing and upgrading

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information management by punched card systems. The programs undertaken thus far, have for the most part been concentrated on limited, more readily defined problems. Note has already been taken in the introduction of the lack of formulation to date of logic systems that would enable the computer to perform some of the basic processes of the human intellect. On the other hand, the capability of the computer to store, process, and deliver increasingly sophisticated correlations of subjects, titles, names, dates and time sequences, commodities, etc. is already well demonstrated.

NSA has been conducting experiments in capturing titles of reports automatically and preparing therefrom permuted word indexes. The Air Force is conducting experiments at SAC, NORAD, and FTD and a somewhat similar system for indexing of intelligence documents called "Key Word in Context" (KWIC). A system based on this principle will become operational on a limited scale in the DIA Current Intelligence and Indications Center in the near future. The Department of State is currently developing a pilot system in the area of Cuban affairs based on a computer and designed to produce permuted subject indexes for the analyst. As of the present time, sentences describing the contents of approximately 5,000 documents of an 88,000 document library on Cuba have been prepared and machine input is expected to begin shortly.

In CIA a major systems study was initiated in 1962 to investigate the application of computers to the Agency's central document storage and retrieval system. The study is now completing an investigation into analyst needs and is expected to proceed with detailed system design, and implementation of initial segments over the next three years. The proposed system would cover all document sources of

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significance to the analyst, all categories of information (persons, organizations, places, things, subjects), and all geographic areas, with minimum handling during processing. It is expected to incorporate input/output devices to speed data transcription and file querying, large capacity memories for index data storage, and a large-capacity document storage system in micro-image form.

Biographic Intelligence Support

The WALNUT system now at an advanced stage of development in CIA is a large file on foreign personalities of counterintelligence interest. Automated document storage and retrieval equipment has been installed, a sophisticated name-searching technique has been designed, and development of very large random access computer memory equipment to store the entire biographic index is at an advanced stage. A proposal is under study to develop a name tracing communications network that would provide quick access to information on foreign personalities stored anywhere in the Intelligence Community.

The Army has been developing since 1957 a computer based system for control of data on foreign ground forces order-of-battle. Detailed items of information on foreign military units, e.g. names of unit commanders, unit designations, locations, will be organized and collated to establish full identification and movement of military units. The system is currently undergoing testing and evaluation.

Overhead Reconnaissance Support

Computer support to overhead reconnaissance has increased significantly during the past two years. Within CIA, computers are being used in the following areas:

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1) determining what to collect (targeting); 2) technical support of operations; 3) information and technical support of photographic interpretation. The computer supported system for information retrieval on targets is an outstanding accomplishment in the information handling field. It brings all pertinent data on each target (what's known and what's needed) to the elbow of the photo-interpreter as he examines new photography. New information gained from the readout is promptly incorporated in the record used to establish new target priorities and to support new studies of the given target.

Machine Translation

While Government funding for MT is not generally done through the Intelligence Community, projects are sponsored by members or otherwise designed to be responsive to their needs. Moreover, the by-products of MT research contribute importantly to the solution of lexical problems other than translation. The present level of Government support to MT is about \$2 million annually.

Two current developments are especially significant. First, CIA is awarding a contract to IBM for equipment which is compatible with that used by AFSC/FTD, and the two will be engaged in a cooperative machine-assisted translation program which should both augment translation capabilities and yield valuable data on operating an MT system. Second, NSF, DOD and CIA have formed a Joint Advisory Group on Automatic Language Processing, and have agreed to support jointly a central staff to coordinate Government supported MT research, evaluate its results, and guide its course in order to accelerate progress in this field.

Other Computer Applications

Many smaller scale or more specialized applications of computers are

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already operative or under development throughout the U.S. intelligence community. These fall into the two principal categories of 1) applications in scientific data processing, and, 2) applications in the fields of political, economic, and military intelligence. In the former category are projects for the analysis and prediction of ballistic missile trajectories and space vehicle orbital paths, air defense radar capabilities in the Soviet Bloc, and nuclear weapons reconstruction. In the second category are projects for the analysis of Bloc strategic military facilities, Soviet missile test range activity, and Soviet military expenditures. Projects are underway for development of a fully automated target information system, and for computer support of the National Indications Center.

Additional General Comments

In the evaluation of analysts problems in information handling sight must not be lost of the far-reaching effects of the limitations on access to information in the closed societies of the Soviet Bloc. Such restrictions enforced by Communist China, for example, force our analysts into costly examinations of fragmented information difficult to evaluate even under optimum conditions. Under these circumstances the analyst has been consistently reluctant to have the collector in the field suppress any part of his acquisitions of possibly relevant information. Computer programmers are finding it necessary therefore to conduct intensive studies of the methods that analysts employ in assembling and using their personal files, in utilizing central information systems, and in communicating with collectors.

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A second point to be emphasized is the recent origin of many of the current concepts in information handling. Intelligence Community experience is still very limited in the management of computers and in the education of analysts in their use. The first generation of staff is being trained and seasoned. New methods of communication between analysts, collectors and computer specialists are being explored. Information center managements are being forced to revise their terms of reference to include computer programing, costing, and control of new magnitudes of data. Many authorities in the ADP field consider that it suffers at present from

- 1) a lack of precise definition and specification of objectives and techniques, and,
- 2) a shortage of first-rate research workers.

(V. Recommendations

A. Clarification of roles and missions

The present organization of the intelligence community promotes legitimate demands by several components to engage in similar if not identical activities. Continuous review and clarification of roles and missions is needed to achieve refinements in assigned responsibilities. This in turn could lead to reduction in the flow of paper at its origins and to a more productive division of labor in information processing. The USIB should investigate this area upon completion of the survey of existing information systems now in progress by the USIB Staff for the Community Information Processing Study (SCIPS).

B. Strengthening of interagency mechanisms for cooperative effort

Present-day problems in handling information are not unique to the

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particularly in the scientific community. Since it has no counterpart in the humanities, it is likely that vigorous action by the Federal Council on Science and Technology's Committee on Scientific Information could and should contribute in areas of importance to intelligence. The USIB should strengthen its ties with and participation in inter-agency mechanisms engaged in the pursuit of solutions to problems of intelligence concern.

C. Identification of specific critical problems and initiation of remedial action

There have been relatively few examples thus far of problems in information handling resolved by the Intelligence Community through collective action. The identification of the problem of compromising emanations from operating flexowriter-type equipment is an example of a current case leading to the development of standard specifications, the designation of an executive agent to proceed with R & D, and an agreement by all to use the equipment once produced. The same can be done in other areas; e.g. to produce an optical character reading device. The USIB should proceed aggressively with the identification of specific problems in information processing and the initiation of joint remedial action in critical cases.

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